PATENT
Attorney Docket No.: 10006299-1

In The U.S. Patent and Trademark Office

In Re the Application of:

Inventor(s):	Qian Lin et al.	**Confirmation No.:**	8971
Serial No.:	09/854,580	**Examiner:**	Yubin Hung
Filed:	May 15, 2001	**Group Art Unit:**	2624
Title:	IMAGE ENHANCEMENT USING FACE DETECTION		

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF FACSIMILE TO THE USPTO

I hereby certify that this correspondence is being transmitted to the Patent and Trademark Office facsimile number (571) 273-8300 on August 9, 2007. This correspondence contains the following document(s):

29 sheets of Appeal Brief – Patents.

Respectfully submitted,

MANNAVA & KANG, P.C.

August 9, 2007

Timothy B. Kang
Reg. No.: 46,423

MANNAVA & KANG, P.C.
8221 Old Courthouse Road
Suite 104
Vienna, VA 22182
(703) 652-3817
(703) 865-5150 (facsimile)

RECEIVED
CENTRAL FAX CENTER
AUG 0 9 2007

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

Attorney Docket No.: 10006299-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Qian Lin et al.	**Confirmation**	8971
U.S. Serial No.:	09/854,580	**Examiner:**	Yubin Hung
Filed:	May 15, 2001	**Group Art**	2624

For: IMAGE ENHANCEMENT USING FACE DETECTION

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUPPLEMENTAL APPEAL BRIEF - PATENTS

Sir:

The Supplemental Appeal Brief is hereby submitted in response to the Notification of Non-Compliant Appeal Brief (hereinafter "Notice") mailed on July 13, 2007. The Notice asserts that the Appeal Brief filed on February 19, 2007 incorrectly lists canceled claims and fails to include a separate heading for the arguments regarding the rejection of claims 1, 2, 8, 10, 15, 21, and 27-33.

Section 3 in the Supplemental Appeal Brief has been amended to replace the listing of claims 6 and 15 with claims 7 and 16. In addition, a new sub-heading under Section (7)(C) entitled "Claims 1, 2, 8, 10, 15, 21, and 27-33" has been added. The headings under the new sub-heading have been assigned reference characters and have been indented to more clearly indicate that they are further sub-headings to the new sub-heading.

Accordingly, it is respectfully submitted that the present Supplemental Appeal Brief is in compliance with 37 C.F.R. § 41.37 and the requirements set forth in the Notice.

RECEIVED
CENTRAL FAX CENTER

AUG 0 9 2007

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

Attorney Docket No.: 10006299-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Qian Lin et al.	**Confirmation**	8971
U.S. Serial No.:	09/854,580	**Examiner:**	Yubin Hung
Filed:	May 15, 2001	**Group Art**	2624

For: IMAGE ENHANCEMENT USING FACE DETECTION

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUPPLEMENTAL APPEAL BRIEF - PATENTS

Sir:

The Supplemental Appeal Brief is hereby submitted in response to the Notification of Non-Compliant Appeal Brief (hereinafter "Notice") mailed on July 13, 2007. The Notice asserts that the Appeal Brief filed on February 19, 2007 incorrectly lists canceled claims and fails to include a separate heading for the arguments regarding the rejection of claims 1, 2, 8, 10, 15, 21, and 27-33.

Section 3 in the Supplemental Appeal Brief has been amended to replace the listing of claims 6 and 15 with claims 7 and 16. In addition, a new sub-heading under Section (7)(C) entitled "Claims 1, 2, 8, 10, 15, 21, and 27-33" has been added. The headings under the new sub-heading have been assigned reference characters and have been indented to more clearly indicate that they are further sub-headings to the new sub-heading.

Accordingly, it is respectfully submitted that the present Supplemental Appeal Brief is in compliance with 37 C.F.R. § 41.37 and the requirements set forth in the Notice.

PATENT

Atty Docket No.: 10006299-1
App. Ser. No.: 09/854,580

TABLE OF CONTENTS

PATENT

Atty Docket No.: 10006299-1
App. Ser. No.: 09/854,580

TABLE OF CONTENTS

RECEIVED
CENTRAL FAX CENTER

AUG 0 9 2007

PATENT

Atty Docket No.: 10006299-1
App. Ser. No.: 09/854,580

(1) Real Party In Interest

The real party in interest is Hewlett-Packard Development Company, L.P., the named assignee in this application.

(2) Related Appeals And Interferences

There are no other appeals or interferences related to this case.

(3) Status Of Claims

Claims 5, 7, 13, 16, 17, 19, 22-24, and 26 have been canceled without prejudice or disclaimer of the subject matter contained therein.

Claims 1-4, 6, 8-12, 14, 15, 18, 20, 21, 25, and 27-33 are pending and stand rejected.

Pursuant to 37 C.F.R. § 41.37, the Appellants hereby appeal the Examiner's decision finally rejecting Claims 1-4, 6, 8-12, 14, 15, 18, 20, 21, 25, and 27-33 to the Board of Patent Appeals and Interferences. Therefore, Claims 1-4, 6, 8-12, 14, 15, 18, 20, 21, 25, and 27-33 of this application are at issue on this appeal.

(4) Status of Amendments

No amendment was filed subsequent to the final Office Action dated September 19, 2006.

A copy of the claims at issue on appeal is attached as the Claims Appendix.

(5) Summary Of Claimed Subject Matter

Claims 1, 8, 15, and 21 of the present invention are the independent claims at issue in this appeal.

Claim 1 pertains to an image enhancement method using face detection algorithms (Figure 3). In the method, one or more human faces in an image are automatically detected and located using face detection algorithms. *Specification*, page 7, lines 27 and 28, describing step 320. In addition, the appearance of the entire image is automatically enhanced by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the one or more human faces, wherein the entire image is automatically enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels. *Specification*, page 7, line 29 to page 8, line 8, describing step 340.

Claim 8 pertains to an apparatus for enhancing an image using face detection algorithms (Figure 1). The apparatus includes a module for automatically detecting human faces in an image using face detection algorithms. The apparatus also includes a module for automatically locating one or more human faces in the image, and a module for automatically enhancing an appearance of the entire image by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the one or more human faces, wherein the entire image is automatically enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels. *Specification*, page 7, line 25 to page 8, line 8. As discussed on page 7, lines 25

and 26, the claimed modules may comprise software modules for execution by a processor 114.

Claim 15 pertains to a computer readable medium comprising instructions for image enhancement using face detection. The computer readable medium instructions include automatically detecting one or more human faces in an image using face detection algorithms, automatically locating the one or more human faces in the image, and automatically enhancing an appearance of the entire image by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the one or more human faces, wherein the target levels are desirable lightness and contrast levels as determined through a determination of human visual preferences, wherein the entire image is automatically enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels. *Specification*, page 7, line 25 to page 8, line 8. As discussed on page 7, lines 25 and 26, the claimed modules may comprise software modules for execution by a processor 114.

Claim 21 pertains to a system for enhancing an image using face detection algorithms. The system includes means for automatically detecting human faces in an image using face detection algorithms, means for automatically locating the human faces in the image, and means for automatically enhancing an appearance of the entire image by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the human faces, wherein the target levels are desirable lightness and contrast levels as determined through a determination of human visual preferences, wherein the entire image is automatically enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels. *Specification*, page 7, line 25 to

page 8, line 8. According to an example, the various means claimed in Claim 21 may comprise the software modules discussed on page 7, lines 25 and 26, which may be executed by a processor 114. In addition, or alternatively, the variously claimed means may comprise the processor 114 and either or both of the memories 102 and 112.

(6) Grounds of Rejection to be Reviewed on Appeal

a) Whether Claims 1, 2, 8, 10, 15, 21, and 27-33 should have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,292,574 to Schildkraut et al. (hereinafter "Schildkraut et al.) in view of U.S. Patent No. 6,181,806 to Kado et al. (hereinafter "Kado et al.") and further in view of U.S. Patent No. 5,410,618 to Fowler (hereinafter "Fowler").

b) Whether Claims 3, 4, 11, 12, and 18 should have been rejected under 35 U.S.C. 103(a) as being unpatentable over Schildkraut et al. in view of Kado et al. and Fowler, and further in view of U.S. Patent No. 6,680,745 to Center, Jr. et al. (hereinafter "Center, Jr. et al.").

c) Whether Claims 6, 14, 20, and 25 should have been rejected under 35 U.S.C. 103(a) as being unpatentable over Schildkraut et al. in view of Kado et al. and Fowler, and further in view of U.S. Patent No. 6,009,209 to Acker et al. (hereinafter "Acker et al.").

RECEIVED
CENTRAL FAX CENTER
AUG 09 2007

(7) **Arguments**

A. The Examiner's Position

With reference to the Final Official Action dated September 19, 2006 (hereinafter "Final Official Action"), the Examiner is of the opinion that the proposed combination of Schildkraut et al., Kado et al., and Fowler discloses all of the features claimed in Claims 1, 2, 8, 10, 15, 21, and 27-33 and that these claims are therefore unpatentable.

In setting forth this rejection, the Examiner asserts that Schildkraut et al. discloses "automatically detecting one or more human faces in an image using face detection algorithms and automatically locating the one or more human faces in the image." The Examiner cites to Figure 2, reference numeral S10; Figure 6; and column 4, line 13 to column 5, line 4 as disclosing these features. (*Final Official Action*, page 5, par. 7).

With further reference to Schildkraut et al., the Examiner correctly notes that Schildkraut et al. fails to disclose that an appearance of an *entire* image is automatically enhanced "by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the one or more human faces, *wherein the entire image is automatically enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels*." Emphasis in original. (*Final Official Action*, page 5, par. 7).

In an effort to make up for this deficiency in Schildkraut et al., the Examiner attempts to rely upon the disclosures contained in Kado et al. and Fowler. More particularly, the Examiner cites to Figure 14, reference numeral 16 and column 7, lines 33-36 of Kado et al. as disclosing automatic brightness measurement and enhancement. The Examiner also cites to Fowler for its disclosure of "linear mean invariant transforms (i.e., a mappings) that enhance

lofargram images in such a way that the each and every strip of the image is enhanced to have *a target level of mean value*." Emphasis in original. (*Final Official Action*, page 6). The Examiner cites to Figure 1, reference numerals 3-7; column 1, lines 30-40; column 3, lines 15-30; column 6, line 48 to column 7, line 5 of Fowler as allegedly disclosing the claimed features discussed above.

The Examiner further asserts that "Fowler discloses enhancing all regions of an image such that each region has a target level for the mean value; in the case of an image containing faces, all facial regions and the non-facial region as a whole are all regions of an image (possibly as a result of some segmentation process)." (*Final Official Action*, page 6). In making this assertion, the Examiner has equated lofargram strips to human faces.

The Examiner is of the further opinion that U.S. Patent No. 6,680,745 to Center, Jr. et al. (hereinafter "Center, Jr. et al.") and U.S. Patent No. 6,009,209 to Acker et al. (hereinafter "Acker et al.") when combined with Schildkraut et al., Kado et al., and Fowler, respectively disclose the invention as claimed in Claims 3, 4, 11, 12, 18, and Claims 6, 14, 20, and 25.

B. Discussion of the Law

The test for determining if a claim is rendered obvious by one or more references for purposes of a rejection under 35 U.S.C. § 103 is set forth in MPEP § 706.02(j):

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both

be found in the prior art and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Therefore, if the above-identified criteria are not met, then the cited references fail to render obvious the claimed invention and, thus, the claimed invention is distinguishable over the cited references.

C. The Appellants' Position

1. Claims 1, 2, 8, 10, 15, 21, and 27-33

a. The Examiner Has Clearly Misconstrued The Fowler Disclosure

In rejecting all of the pending claims, the Examiner asserts that "Fowler discloses enhancing all regions of an image such that each region has a target level for the mean value; in the case of an image containing faces, all facial regions and the non-facial region as a whole are all regions of an image (possibly as a result of some segmentation process)." (*Final Official Action*, page 6). The Examiner has thus interpreted Fowler as disclosing that an **entire image**, such as a lofargram image, is enhanced such that a **particular region** has a target level for the mean value. The Examiner has further interpreted a lofargram strip as being equivalent to a facial region in an image and the lofargram as the entire image. These assertions are clearly improper for at least the following reasons.

Fowler discloses a method for enhancing lofargram data images. (Abstract). Fowler defines "lofargrams" as "low frequency analyzing and recording gram data." Column 2, lines 9 and 10. Lofargrams are typically used in submarines as visual displays of sonar images. In this respect, Fowler indicates that "[t]he purpose of the present invention is to provide a gray-

scale mapping of lofargram data enhancing it in such a way as to make signals of interest more readily visible and distinguishable from background noise and to display more clearly the structure of the signals for better characterization." (Column 2, lines 28-34).

In describing how the lofargram data is enhanced, Fowler indicates that the lofargram data is segmented "into a number of vertical frequency strips covering the entire frequency range of a lofargram image." (Figure 2b; Column 3, lines 7-10). Fowler also discloses that the mean and variance of the frequency for each of the vertical frequency strips 10 is determined. (Column 3, lines 46-50). Fowler further discloses that each of the vertical frequency strips 10 is enhanced "by applying a linear transformation to the gray scale value (P) of each pixel 11 within a vertical strip 10. The pixel is transformed to a more visible rate and a new gray scale value (*Pnew*) for the pixel is created..." (Column 5, lines 24-33). As such, Fowler discloses that each of the vertical frequency strips 10 is separately enhanced and stitched back together to provide "a complete, enhanced lofargram image." (Column 3, lines 23-30).

Fowler apparently discloses, therefore, that the pixels of a particular vertical frequency strip are enhanced according to the mean and variance of the frequency for that particular vertical frequency strip. In other words, the mean and variance of the frequency in another vertical frequency strip have no effect on the pixels of the particular vertical frequency strip. As such, the pixels in one of the vertical frequency strips may be modified to have differing levels of enhancement as compared with the pixels in another of the vertical frequency strips.

Accordingly, the entire lofargram image is therefore not enhanced to make one of the vertical frequency strips have target levels for the mean value or the variation value of the

pixels contained in any one of the vertical frequency strips. Instead, Fowler discloses that each of the vertical frequency strips is individually modified and stitched back together.

The Examiner has therefore clearly erred in asserting that the entire lofargram image is enhanced such that the pixels in a particular one of the vertical frequency strips have target levels for the mean value or the variation value of the pixels in the particular vertical frequency strip. As discussed in greater detail below, this is an important distinction because the Examiner has equated the one or more vertical frequency strips in Fowler to the one or more human faces as claimed in independent Claims 1, 8, 15, and 21 of the present invention.

b. The Proposed Combination of References Fails to Disclose the Claimed Invention

Independent Claims 1, 8, 15, and 21, recite in various forms, *inter alia*, that an appearance of an **entire image** is enhanced by using a mapping technique to produce the **image** with target levels for a mean value or a variation value of the pixels in **one or more human faces** located in the image, where the entire image is automatically enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels.

The Examiner relies upon Shildkraut et al. for its disclosure of an algorithm that automatically detects human faces in an image. In addition, the Examiner indicates that Shildkraut et al. fails to disclose that an appearance of the image is automatically enhanced by using the mapping technique claimed at least in Claims 1, 8, 15, and 21.

In an effort to make up for this deficiency in Shildkraut et al., the Examiner relies upon the disclosures contained in column 7, lines 30-52 of Kado et al. and Figure 1, reference

numerals 3-7, column 1, lines 30-40, column 3, lines 15-30, and column 6, lines 48-column 7, line 5 of Fowler. More particularly, the Examiner argues that it would have been obvious to combine Shildkraut et al., Kado et al., and Fowler to somehow arrive at the claimed invention as set forth in independent Claims 1, 8, 15, and 21. The obviousness of the proposed combination is alleged upon the assertion that enhancing the image of the faces in Shildkraut et al. is an improvement over simply reducing red eye artifacts in Shildkraut et al.

It is respectfully submitted, however, that the references cited by the Examiner fail to at least disclose that the **entire image** in which the one or more human faces are located is enhanced by using the above-described mapping technique, such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels. As such, the Examiner's proposed combination of these references fails to render the claimed invention obvious.

As the Examiner has asserted, Shildkraut et al. merely discloses techniques for reducing red eye artifacts in images containing human faces. (Shildkraut et al., column 1, lines 36-48). Shildkraut et al. therefore fails to disclose that the entire image in which one or more human faces are located is enhanced at all.

Kado et al. pertains to the identification of a person using facial features. The identification is performed by comparing an image of a person with a stored image to determine similarities. Kado et al. discloses, in column 7, lines 24-52, that the brightnesses of various patches of human faces are corrected "to prevent misjudgment due to a difference in the position of the light source in photographing." Kado et al. also discloses that "the brightness of a patch whose normal is closer to the old direction of the light source is lowered, and the brightness of a patch whose normal is closer to the new direction of the light

source is raised...[so that] misjudgment can be prevented under different illumination conditions."

In other words, Kado et al. discloses that the "patches" of a human face, and not the human face nor the entire image containing the human face, are corrected to make it appear that the human face is being illuminated under the same conditions as when the stored image was obtained. One can reasonably assume that the "patches" referred to in Kado et al. pertain to dark spots, such as shadows, and light spots, such as light reflections, because Kado et al. is only interested in attempting to make the lighting conditions of when the stored image was obtained and the image under consideration was obtained as uniform as possible such that the two images are more readily comparable. Kado et al. therefore also fails to disclose that the entire image in which one or more human faces are located is enhanced as claimed in Claims 1, 8, 15, and 21 of the present invention.

Accordingly, the Examiner's proposed modification of Shildkraut et al. based upon the disclosure contained in Kado et al. would still fail to disclose or fairly suggest each and every element claimed in independent Claims 1, 8, 15, and 21. More particularly, for instance, the proposed modification would at least fail to disclose that the entire image in Shildkraut et al. is enhanced. The Examiner's reliance upon Fowler also fails to make up for these deficiencies.

As stated by the Examiner, Fowler "discloses a mapping technique specifically designed for lofargram images." Fowler discloses, in Figure 1, that the mapping technique includes segmenting the lofargram into strips (step 3), computing mean and variance for each strip (step 4), using a rule base to determine the new mean and variance for the strip (step 5), determining scalar and bias for the strip (step 6), and scaling and biasing each pixel in each

strip (step 7). Accordingly, Fowler discloses that the mean and variance for each of the strips are separately and individually computed and that the scalar and bias are individually determined for each strip. In addition, once the pixels in the strips have been scaled and biased (step 6), the strips are stitched back together (step 8).

In other words, therefore, Fowler does not disclose that the entire lofargram image is enhanced based on any of the individual strips as discussed above. Furthermore, therefore, even assuming for the sake of argument that a vertical frequency strip of Fowler can reasonably be equated to a human face and that the entire lofargram data can be reasonably be equated to the claimed entire image, Fowler would fail to disclose that the pixels in one or more of the human faces have target levels for the mean value or the variation value of the pixels as claimed in Claims 1, 8, 15, and 21 of the present invention. Instead, if the lofargram data and the image containing human faces could somehow be equated as suggested by the Examiner, such a comparison would result in various sections of the image containing the human faces to be separately enhanced, as the different vertical frequency strips are separately enhanced in Fowler.

Clearly, therefore, Fowler fails to disclose that the entire image is enhanced such that the pixels in the one or more human faces have the target levels for the mean value of the variation value of the pixels. Accordingly, the Examiner's proposed modification of Shildkraut et al. and Kado et al. based upon the disclosure contained in Fowler, would also fail to disclose or suggest each and every element claimed in Claims 1, 8, 15, and 21. More particularly, for instance, the proposed modification would at least fail to disclose that the **entire image** in Shildkraut et al. is enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels.

Therefore, even assuming for the sake of argument that one of ordinary skill in the art would somehow have been motivated to combine the disclosures of Shildkraut et al., Kado et al. and Fowler as proposed by the Examiner, the proposed combination would still fail to disclose all of the features of the claimed invention as set forth in Claims 1, 8, 15, and 21. For at least this reason, the Examiner has failed to establish that Claims 1, 8, 15, and 21 and the claims that depend therefrom are *prima facie* obvious in view of the Shildkraut et al., Kado et al., and Fowler disclosures.

With regard also to independent Claims 15 and 21, none of the cited references discloses that the target levels for a mean value or a variation value are desirable lightness and contrast levels that are determined through a determination of human visual preferences. Instead, Shildkraut et al. is concerned with automatic face detection and red eye reduction, Kado et al. is concerned with matching the brightness levels of patches in human face images with another human face image, and Fowler is concerned with enhancing lofargram data to better distinguish signals of interest from background noise. As such, for instance, none of these references would appear to benefit from enhancing images based upon the target levels as claimed in Claims 15 and 21.

c. The Proposed Combination of Documents Fails to Disclose that the Target Levels for a Mean Value or a Variation Value are Desirable Lightness and Contrast Levels that are Determined Through a Determination of Human Visual Preferences

The Examiner asserts that Kado et al. discloses that "pixel values that are to be enhanced to achieve target levels for a mean are lightness values". This assertion may be correct; however, this assertion differs from the claimed features that the target levels for a

mean value or a variation value are desirable lightness and contrast levels that are determined through a determination of human visual preferences. In other words, Kado et al. fails to at least disclose that the brightness correction disclosed in column 7, lines 24-52 is based upon a determination of human visual preferences. Instead, Kado et al. discloses that the brightness correction is performed in an effort to make the face images more uniform so that comparisons of the face images may be made with greater accuracy.

The Examiner also asserts that Fowler "discloses adjusting the pixel values to achieve a desired variance value, which results in a different contrast." Again, this assertion differs from the claimed feature that the target levels for a mean value or a variation value are desirable lightness and contrast levels that are determined through a determination of human visual preferences. In addition, and as discussed in greater detail below, Fowler is concerned with enhancing lofargram data such that the signals in the lofargrams may be better distinguished from background noise. As such, the enhancement performed on the lofargram data would not be based upon human visual preferences.

The Examiner further asserts that the aim of the redeye reduction in Shildkraut et al. is to make the image more appealing, and thus "further enhancement by mapping the pixel values of the image to obtain desirable target levels for a mean value or a variation value...can benefit Shildkraut's invention by further enhancing the image." In this passage, the Examiner has asserted a benefit in enhancing Shidkraut et al., but has failed to indicate that Shildkraut et al. discloses that the target levels for a mean value or a variation value are desirable lightness and contrast levels that are determined through a determination of human visual preferences. In fact, it is respectfully submitted that because Shildkraut et al. is only directed to redeye reduction in images, that Shildkraut et al. would not rely upon human

visual preferences to perform the redeye reduction. Instead, the redeye reduction would merely be performed to remove the redeye effect from the images.

For at least the foregoing reasons, it is respectfully submitted that the proposed combination of documents fails to disclose all of the features of independent Claims 15 and 21.

d. The Proposed Combination of Documents is Improper

The Examiner asserts that the proposed combination of Shildkraut et al., Kado et al., and Fowler is proper because they are all in the field of endeavor of image enhancement. Although these documents may be in the same broad field of image enhancement, Fowler's field of endeavor at least differs from that of Shildkraut et al. and Kado et al. because Fowler is directed to sonar images and Shildkraut et al. and Kado et al. are directed to facial images. It seems highly unlikely for one of ordinary skill in the art of facial recognition and facial image enhancement to look at the art of sonar images. As such, it appears likely that the proposed combination of documents was based upon improper hindsight reasoning.

In addition, even if one of ordinary skill in the art were somehow motivated to combine these documents, the proposed combination would still fail to disclose each and every element claimed in Claims 1, 8, 15, and 21. For instance, the proposed combination would still fail to disclose or fairly suggest that an entire image is automatically enhanced to produce the image such that the pixels in one or more human faces have target levels for a mean value or a variation value of the pixels, as discussed above.

Accordingly, it is respectfully submitted that the proposed combination of documents is improper and should be withdrawn.

e. The Proposed Motivation to Combine the References is Improper

The motivation to combine the disclosures of Shildkraut et al., Kado et al., and Fowler proffered by the Examiner is clearly improper. More particularly, the proposed motivation for wanting to combine these references is improper because Fowler pertains to enhancement of vertical frequency strips of sonar image data; whereas Shildkraut et al. pertains to red eye detection and Kado et al. pertains to the identification of a person using facial features, by comparing two images of the person. Thus, although Shildkraut et al., Kado et al., and Fowler are concerned with image enhancement, all three of these references are concerned with completely different fields of image enhancement and one of ordinary skill in the art would not have been motivated to combine these references as asserted by the Examiner.

In fact, the Examiner has provided no evidence that the proposed combination of Shildkraut et al., Kado et al., and Fowler would result in giving "a user better control in enhancement process so that the resultant image can have a desired appearance or perceptual quality specific to the user's preference". In addition, because the disclosures contained in Shildkraut et al., Kado et al., and Fowler are so drastically different, there is no clear indication as to what the proposed combination would yield. It appears extremely likely, however, that the proposed combination would not yield the features claimed in Claims 1, 8, 15, and 21 of the present invention and the claims that depend therefrom.

Accordingly, it is respectfully submitted that the proposed combination of Shildkraut et al., Kado et al., and Fowler is improper and should be withdrawn.

2. Claims 3, 4, 11, 12, and 18

Claims 3, 4, 11, 12, and 18 have been rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the disclosure contained in Shildkraut et al. in view of Kado et al. and Fowler, and further in view of Center, Jr. et al. This rejection is respectfully traversed because Shildkraut et al. considered singly or in combination with Kado et al., Fowler, and Center, Jr. et al. fails to disclose all of the elements of independent Claims 1, 8, and 15 and the claims that depend therefrom.

The Examiner asserts that Center, Jr. et al. discloses that contrast and/or color is changed to enhance an appearance of an image. The Examiner does not however, assert that Center, Jr. et al. discloses automatically enhancing an appearance of an image by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the human faces, as claimed in independent Claims 1, 8, 15, and 21. The Examiner also cannot reasonably assert that Center, Jr. et al. discloses these features. As such, Center, Jr. et al. does not make up for the deficiencies in Shildkraut et al., Kado et al., and Fowler as described above. The proposed combination of Shildkraut et al., Kado et al, Fowler, and Center, Jr. et al., therefore, fails to disclose all of the features of independent Claims 1, 8, and 15 and the claims that depend therefrom.

Accordingly, the Examiner is respectfully requested to withdraw the rejection of Claims 3, 4, 11, 12, and 18 and to allow these claims.

3. Claims 6, 14, 20, and 25

The Official Action sets forth a rejection of Claims 6, 14, 20, and 25 under 35 U.S.C. §103(a) as allegedly being unpatentable over the disclosure contained in Shildkraut et al. in

view of Kado et al. and Fowler, and further in view of Acker et al. This rejection is respectfully traversed because Shildkraut et al. considered singly or in combination with Kado et al., Fowler, and Acker et al. fails to disclose all of the elements of independent Claims 1, 8, 15 and 21 and the claims that depend therefrom.

The Examiner asserts that Acker et al. discloses "reducing or removing the red eye artifact from the human faces." The Examiner does not however, assert that Acker et al. discloses automatically enhancing an appearance of an image by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the human faces, as claimed in independent Claims 1, 8, 15, and 21. The Examiner also cannot reasonably assert that Center, Jr. et al. discloses these features. As such, Center, Jr. et al. does not make up for the deficiencies in Shildkraut et al., Kado et al., and Fowler as described above. As such, Acker et al. does not make up for the deficiencies in Shildkraut et al., Kado et al., and Fowler as described above. The proposed combination of Shildkraut et al., Kado et al, Fowler, and Acker et al., therefore, fails to disclose all of the features of independent Claims 1, 8, 15, and 21 and the claims that depend therefrom.

Accordingly, the Examiner is respectfully requested to withdraw the rejection of Claims 6, 14, 20, and 25 and to allow these claims.

RECEIVED
CENTRAL FAX CENTER

AUG 0 9 2007

PATENT

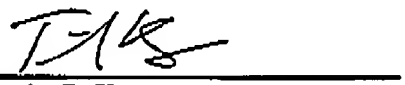
Atty Docket No.: 10006299-1
App. Ser. No.: 09/854,580

(8) Conclusion

For at least the reasons given above, the rejections of claims 1-3, 4, 6, 8-12, 14, 15, 18, 20, 21, 25, and 27-33 are improper. Accordingly, it is respectfully requested that such rejections by the examiner be reversed and these claims be allowed. Attached below for the Board's convenience is an Appendix of Claims 1-3, 4, 6, 8-12, 14, 15, 18, 20, 21, 25, and 27-33 as currently pending.

Please grant any required extensions of time and charge any fees due in connection with this Appeal Brief to deposit account no. 08-2025.

Respectfully submitted,

Dated: August 9, 2007 By 

Timothy B. Kang
Registration No.: 46,423

MANNAVA & KANG, P.C.
8221 Old Courthouse Road
Suite 104
Vienna, VA 22182
(703) 652-3817
(703) 865-5150 (facsimile)

PATENT

Atty Docket No.: 10006299-1
App. Ser. No.: 09/854,580

(9) Claim Appendix

1. An image enhancement method using face detection algorithms, comprising:

automatically detecting one or more human faces in an image using face detection algorithms;

automatically locating the one or more human faces in the image; and

automatically enhancing an appearance of the entire image by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the one or more human faces, wherein the entire image is automatically enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels.

2. The method of claim 1, wherein the enhancing step includes automatically enhancing lightness levels of the image to enhance the appearance of the one or more human faces.

3. The method of claim 1, wherein the enhancing step includes automatically enhancing contrast levels of the image to enhance the appearance of the one or more human faces.

4. The method of claim 1, wherein the enhancing step includes automatically enhancing color levels of the image to enhance the appearance of the one or more human faces.

6. The method of claim 27, wherein the enhancing step comprises:

reducing or removing the red eye artifact from the one or more human faces.

8. An apparatus for enhancing an image using face detection algorithms, comprising:

a module for automatically detecting human faces in an image using face detection algorithms;

a module for automatically locating one or more human faces in the image; and

a module for automatically enhancing an appearance of the entire image by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the one or more human faces, wherein the entire image is automatically enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels.

9. The apparatus of claim 8, wherein the image is a digital image.

10. The apparatus of claim 8, wherein the module for enhancing the appearances of the image includes a module for automatically enhancing lightness levels of the image to enhance the appearance of the one or more human faces.

11. The apparatus of claim 8, wherein the module for enhancing the appearances of the image includes a module for automatically enhancing contrast levels of the image to enhance the appearance of the one or more human faces.

12. The apparatus of claim 8, wherein the module for enhancing the appearances of the image includes a module for automatically enhancing color levels of the image to enhance the appearance of the one or more human faces.

14. The apparatus of claim 28, wherein the module for enhancing the appearances of the image comprises:

a module for reducing or removing the red eye artifact from the one or more human faces.

15. A computer readable medium comprising instructions for image enhancement using face detection, the instructions comprising:

automatically detecting one or more human faces in an image using face detection algorithms;

automatically locating the one or more human faces in the image; and

automatically enhancing an appearance of the entire image by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the one or more human faces, wherein the target levels are desirable lightness and contrast levels as determined through a determination of human visual preferences, wherein the entire image is automatically enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels.

18. The computer readable medium of claim 15, wherein the instructions for enhancing the appearance of the image includes automatically enhancing color levels of the image to enhance the appearance of the one or more human faces to a target level as determined through a determination of human visual preferences.

20. The computer readable medium of claim 29, wherein the instructions for enhancing the appearance of the image comprises:

reducing or removing the red eye artifact of the human faces.

21. A system for enhancing an image using face detection algorithms, said system comprising:

means for automatically detecting human faces in an image using face detection algorithms;

means for automatically locating the human faces in the image; and

means for automatically enhancing an appearance of the entire image by using a mapping technique to produce the image with target levels for a mean value or a variation value of the pixels in the human faces, wherein the target levels are desirable lightness and contrast levels as determined through a determination of human visual preferences, wherein the entire image is automatically enhanced such that the pixels in the one or more human faces have the target levels for the mean value or the variation value of the pixels.

25. The system of claim 21, wherein the means for enhancing includes means for automatically locating eyes in the human faces and means for reducing or removing the red eye artifact from the human faces.

27. The method of claim 1, wherein the locating step includes automatically locating eyes in the human faces.

28. The apparatus of claim 8, wherein the module for locating the human faces includes a module for automatically locating eyes in the human faces.

29. The computer readable medium of claim 15, wherein the instructions for locating the human faces include automatically locating eyes in the human faces.

30. The method of claim 1, wherein the enhancing step further comprises enhancing the image by one of adding and subtracting a fixed amount to a lightness component of each pixel in the human faces, wherein the fixed amount is selected to produce an output image with a target mean lightness level of the pixels (x) in the face region, and wherein the output image (y) is determined through the following equation,

$y = x + T$, where $T = m_t - m_x$, wherein m_x is the mean of x and T is a transformation that substantially ensures that the m_x is equivalent to an output image m_t.

31. The method of claim 1, wherein the enhancing step further comprises enhancing the image by substantially ensuring that an output image (y) has a target standard deviation σ_t, wherein the output image (y) is determined through the following equation,

$y = Tx + (1 - T)m_x$, where $T = \sqrt{\frac{\sigma_t^2}{\sigma_x^2}}$, wherein x represents the face pixels in the image, m_x is the mean of x, σ_x is the standard deviation of the face pixels x, and T is a transformation that substantially ensures that the standard deviation σ_x is equivalent to the target standard deviation σ_t.

32. The method of claim 1, wherein the target levels are desirable lightness and contrast levels as determined through a determination of human visual preferences.

33. The apparatus of claim 8, wherein the target levels are desirable lightness and contrast levels as determined through a determination of human visual preferences.

PATENT

Atty Docket No.: 10006299-1
App. Ser. No.: 09/854,580

(10) Evidence Appendix

None.

PATENT

Atty Docket No.: 10006299-1
App. Ser. No.: 09/854,580

(11) Related Proceedings Appendix

None.